

# PATENT ABSTRACTS OF JAPAN

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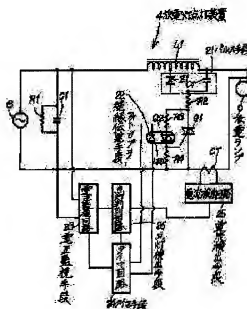
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## (54) DISCHARGE LAMP LIGHTING DEVICE AND LIGHTING SYSTEM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a lighting system capable of surely re-starting a discharge lamp.

**SOLUTION:** When a power source circuit is turned on and voltage of commercial AC power source (e) is detected with a voltage monitoring circuit 23, a timer circuit 24 outputs a pulse for several seconds. A light emitting diode LED emits light by the pulse output, a photo triac Q2 is turned on and a triac Q1 is turned on, a capacitor C1 is charged, a constant voltage element Z1 is turned on, voltage is raised with a coil L1, a pulse is supplied to a high intensity discharge lamp 9, and the high intensity discharge lamp 9 starts lighting. When the high intensity discharge lamp 9 puts out lights, lamp current does not flow, current is not detected with a current detecting circuit 25, and no lighting of the high intensity discharge lamp 9 is detected with a lighting judging circuit 26. The timer circuit 24 stops pulse output for several seconds enough to cool the high intensity discharge lamp 9, then outputs a pulse, applies high voltage to the high intensity discharge lamp 9 to surely re-starts the high intensity discharge lamp 9.



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CLAIMS

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[Claim(s)]

[Claim 1]A discharge lamp lighting device possessing a timer means which clocks predetermined time again on both sides of a quiescent period after predetermined time after powering on, and this specified time elapse, a pulse means to give a pulse to a discharge lamp at predetermined time clocked by; timer means, and;.

[Claim 2]The discharge lamp lighting device according to claim 1, wherein a quiescent period is sufficient time to cool a discharge lamp.

[Claim 3]A discharge lamp lighting device given in claims 1 and 2 only when it has a lighting detection means to detect lighting of a discharge lamp, and a non-point of a discharge lamp is detected by this lighting detection means, wherein a timer means measures predetermined time again after a quiescent period.

[Claim 4]The discharge lamp lighting device according to claim 3, wherein it has a current detecting means which detects lamp current of a discharge lamp and a lighting detection means detects lighting by existence of lamp current of a current detecting means.

[Claim 5]Claims 1 thru/ or 4 which are provided with a temperature detecting means which detects temperature of a discharge lamp, and are characterized by a timer means setting up a quiescent period according to temperature detected by this temperature detecting means are the discharge lamp lighting devices of a statement either.

[Claim 6]Claims 1 thru/ or 5 detecting powering on by existence of voltage have a voltage monitoring means which supervises voltage and according [ a timer means ] to this voltage monitoring means are the discharge lamp lighting devices of a statement either.

[Claim 7]Claims 1 thru/ or 6 possessing an insulating means of communication which insulates a timer means and a pulse means electrically, and connects are the discharge lamp lighting devices of a statement either.

[Claim 8]The discharge lamp lighting device according to claim 7, wherein an insulating means of communication is a photocoupler.

[Claim 9]A lighting system possessing a device body in which it is equipped with a discharge lamp lighting device and; discharge lamp given in claims 1 thru/ or 8 which make a discharge lamp turn on, and;.

[Claim 10]A lighting system possessing a device body in which it is equipped with a discharge lamp lighting device,; discharge lamp, and a discharge lamp lighting device given in claims 1 thru/ or 8 which make a discharge lamp turn on, and;.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the discharge lamp lighting device and lighting system to which a pulse is given at the time of start up and to which the starting point light of the discharge lamp is carried out.

[0002]

[Description of the Prior Art]Conventionally, as this kind of a discharge lamp lighting device, the composition of the statement is known by JP,7-203977,A, for example.

[0003]Composition given in this JP,7-203977,A supplies the start pulse of predetermined time high tension to a discharge lamp at the time of start up of a discharge lamp, and starts a discharge lamp.

[0004]

[Problem(s) to be Solved by the Invention]However, with composition given in this JP,7-203977,A, since a start pulse is supplied to a discharge lamp in the state where the discharge lamp is not cooled when restarting after a discharge lamp goes out, it has a problem with a possibility of becoming difficult to restart a discharge lamp.

[0005]This invention was made in view of the above-mentioned problem, and an object of this invention is to provide the discharge lamp lighting device and lighting system which can restart a discharge lamp certainly.

[0006]

[Means for Solving the Problem]The discharge lamp lighting device according to claim 1 is a thing possessing a timer means which clocks predetermined time again on both sides of a quiescent period after predetermined time after powering on, and this specified time elapse, and a pulse means to give a pulse to predetermined time clocked by; timer means at a discharge lamp. Since a discharge lamp is cooled in a quiescent period even after a discharge lamp goes out in order that a timer means may clock predetermined time again on both sides of a quiescent period after going through predetermined time after powering on, a discharge lamp restarts certainly.

[0007]In the discharge lamp lighting device according to claim 1, a quiescent period is sufficient time to cool a discharge lamp, and since a discharge lamp is cooled certainly at a quiescent period, the discharge lamp lighting device according to claim 2 restarts a discharge lamp more certainly.

[0008]The discharge lamp lighting device according to claim 3 is provided with a lighting detection means to detect lighting of a discharge lamp, in a discharge lamp lighting device given in claims 1 and 2, and a timer means. Only when a non-point of a discharge lamp is detected by this lighting detection means, in order that only the state where predetermined time is again measured after a quiescent period, and a discharge lamp is not on may supply a pulse to a discharge lamp, an unnecessary pulse is lost and it is efficient.

[0009]The discharge lamp lighting device according to claim 4 is provided with a current detecting means which detects lamp current of a discharge lamp in the discharge lamp lighting device according to claim 3, and a lighting detection means detects lighting by existence of lamp current of a current detecting means, and detects existence of lighting of a discharge lamp with

an easy device.

[0010]Either, in a discharge lamp lighting device of a statement, it has a temperature detecting means which detects temperature of a discharge lamp, and a timer means sets up a quiescent period according to temperature detected by this temperature detecting means, and, as for the discharge lamp lighting device according to claim 5, claims 1 thru/or 4 detect cooling of a discharge lamp certainly.

[0011]Either, in a discharge lamp lighting device of a statement, it has a voltage monitoring means which supervises voltage, and a timer means detects powering on by existence of voltage by this voltage monitoring means, and, as for the discharge lamp lighting device according to claim 6, claims 1 thru/or 5 detect powering on certainly.

[0012]As for the discharge lamp lighting device according to claim 7, claims 1 thru/or 6 are the things possessing an insulating means of communication which insulates a timer means and a pulse means electrically, and connects in a discharge lamp lighting device of a statement either, Generally a timer means can be electrically insulated from a pulse means of high tension, and a timer means cannot be easily influenced by high tension by a pulse means.

[0013]In the discharge lamp lighting device according to claim 7, an insulating means of communication is a photocoupler and can insulate easily the discharge lamp lighting device according to claim 8 electrically.

[0014]The lighting system according to claim 9 is a thing possessing a device body in which it is equipped with a discharge lamp lighting device and; discharge lamp given in claims 1 thru/or 8 which make a discharge lamp turn on, and does each operation so.

[0015]The lighting system according to claim 10 is a thing possessing a device body in which it is equipped with a discharge lamp lighting device,; discharge lamp, and a discharge lamp lighting device given in claims 1 thru/or 8 which make a discharge lamp turn on, and does each operation so.

[0016]

[Embodiment of the Invention]Hereafter, the 1 embodiment of the lighting system of this invention is described with reference to drawings.

[0017]Drawing 1 is a circuit diagram showing a discharge lamp lighting device, and drawing 2 is the sectional view which cut and lacked the part which shows a lighting system.

[0018]As shown in drawing 2, the floodlight 1 as a lighting system, Have the device body 2 of rotation curved surface shape made from aluminum dies casting, and the exposure opening 3 is formed in the front face of this device body 2, The box 5 where the discharge lamp lighting device 4 made to generate a start pulse is stored by the back of the device body 2 is attached, the attachment body which is not illustrated for attaching to a lighting etc. is formed in the upper surface, and the cooling fins 6 and 7 for cooling are formed in the back side. In the device body 2, the lamp socket 8 of the couple is attached at the back close-attendants side, and the short arc type high intensity discharge lamp 9 is attached among these lamp sockets 8. The high intensity discharge lamp 9 is included to the inner surface of the device body 2, and it is equipped with the reflector 10 of rotation curved surface shape like the device body 2.

[0019]The translucent cover 11 made from plate-like tempered glass is held at the frame 12, and is attached to the front exposure opening 3 at the device body 2 so that opening and closing are possible.

[0020]And the resistance R1 and the capacitor C1 are connected to the commercial alternating current power e in parallel, and the discharge lamp lighting device 4 is connected to the high intensity discharge lamp 9 via the coil L1. The pulse circuit 21 as a pulse means is connected to the coil L1, and this pulse circuit 21 comprises a series circuit of the constant voltage element Z1 and the capacitor C1 between the middle point of the coil L1, and an end. The node of the constant voltage element Z1 and the capacitor C1, It is connected to the other end of the commercial alternating current power e via the resistance R2 and the triac Q1 as a switching element, Between the resistance R2 and the gate of the triac Q1, the series circuit of the photo triac Q2 of the photocoupler 22 as the resistance R3 and an insulating means of communication is connected, and the resistance R4 is connected between the gate of the triac Q1, and the other end.

[0021] Among the both ends of the commercial alternating current power e, the voltage monitoring circuit 23 as a voltage monitoring means which supervises the existence of powering on is connected, and this voltage monitoring circuit 23 is connected to the timer circuit 24 as a timer means. On the other hand, current transformer CT which detects the lamp current of the high intensity discharge lamp 9 is provided, The current detecting circuit 25 as a current detecting means is connected to this current transformer CT, this current detecting circuit 25 is connected to the lighting discrimination circuit 26 as a lighting detection means, and this lighting discrimination circuit 26 is connected to the voltage monitoring circuit 23 and the timer circuit 24.

[0022] Next, operation of the above-mentioned embodiment is explained.

[0023] First, if a power supply is switched on and the voltage of the commercial alternating current power e is detected in the voltage monitoring circuit 23, the timer circuit 24 will detect about predetermined time, for example, several seconds, and as shown in drawing 3, it will carry out a pulse output. One [ light emitting diode LED emits light by this pulse output, and / the photo triac Q2 ], With one of this photo triac Q2, and the capacitor C1 is charged, [ the triac Q1 ] If this capacitor C1 becomes more than prescribed voltage, and pressure up will be carried out with the coil L1, a pulse is supplied to the high intensity discharge lamp 9, and the high intensity discharge lamp 9 carries out starting point light. [ the constant voltage element Z1 ]

[0024] And if the lamp current of the high intensity discharge lamp 9 is detected by current transformer CT, in the current detecting circuit 25, it will detect that lamp current is flowing and lighting of the high intensity discharge lamp 9 will be detected in the lighting discrimination circuit 26. Thus, if lighting of the high intensity discharge lamp 9 is detected in the lighting discrimination circuit 26, the timer circuit 24 ends a time check, the pulse output of the pulse circuit 21 will not be carried out, but the voltage of the commercial alternating current power e will be impressed to the high intensity discharge lamp 9 via the coil L1, and the high intensity discharge lamp 9 will maintain a lighted condition.

[0025] On the other hand, the high intensity discharge lamp 9 by going out and others in the case of non-punctiform voice, Since lamp current does not flow, current does not flow into current transformer CT and current is not detected in the current detecting circuit 25, Sufficient time for the lighting discrimination circuit 26 to detect the non-point of the high intensity discharge lamp 9, and for the high intensity discharge lamp 9 to be cooled in the timer circuit 24, For example, after stopping a pulse output about several minutes, a pulse output is carried out, the pulse of high tension is impressed to the high intensity discharge lamp 9 like an above-mentioned case, and the high intensity discharge lamp 9 is made to restart certainly.

[0026] As mentioned above, since the pulse output of it is again carried out after the hour timer circuit 24 which is a grade which can cool the high intensity discharge lamp 9 stops a pulse output, Since parts, such as other coils L1, are similarly cooled while it is fully cooled and the high intensity discharge lamp 9 can restart certainly, insulation deterioration is also hard to be promoted and a prolonged insulation can be held.

[0027] Since the timer circuit 24 and the pulse circuit 21 are electrically insulated by the photocoupler 22, the timer circuit 24 can be prevented from the ability to have an adverse effect with the high tension of the pulse circuit 21 which generates high tension.

[0028] The high intensity discharge lamp 9, the parts which are hard to be cooled, the parts which are easy to be heated, Or even if a temperature sensor is attached to the parts which are easy to be influenced with other temperature and it controls the quiescent period of the timer circuit 24 only by the time check of the timer circuit 24, or a temperature sensor on them, the adverse effect by heat can be prevented certainly.

[0029]

[Effect of the Invention] Since a discharge lamp is cooled in a quiescent period even after a discharge lamp goes out in order that according to the discharge lamp lighting device according to claim 1 a timer means may clock predetermined time again on both sides of a quiescent period after going through the predetermined time after powering on, a discharge lamp can restart certainly.

[0030] Since it is sufficient time for a quiescent period to cool a discharge lamp in addition to the

discharge lamp lighting device according to claim 1 according to the discharge lamp lighting device according to claim 2 and a discharge lamp is cooled certainly at a quiescent period, a discharge lamp can be restarted more certainly.

[0031] Since according to the discharge lamp lighting device according to claim 3 in addition to a discharge lamp lighting device given in claims 1 and 2 a timer means measures predetermined time again after a quiescent period only when the non-point of a discharge lamp is detected by a lighting detection means. Since only the state where the discharge lamp is not on supplies a pulse to a discharge lamp, an unnecessary pulse is lost and it can do efficiently.

[0032] Since a lighting detection means detects [ according to the discharge lamp lighting device according to claim 4 ] lighting by the existence of the lamp current of a current detecting means in addition to the discharge lamp lighting device according to claim 3, the existence of lighting of a discharge lamp is detectable with an easy device.

[0033] There is no claim 1, and 4 either, in the discharge lamp lighting device of a statement, since a timer means sets up a quiescent period according to the temperature detected by the temperature detecting means, cooling of a discharge lamp is certainly detectable according to the discharge lamp lighting device according to claim 5.

[0034] According to the discharge lamp lighting device according to claim 6, there is no claim 1, and since a timer means detects powering on by the existence of the voltage by a voltage monitoring means 5 either in addition to the discharge lamp lighting device of a statement, powering on is certainly detectable.

[0035] Since an insulating means of communication which insulates a timer means and a pulse means electrically, and connects was provided [ according to the discharge lamp lighting device according to claim 7 ] in addition to [ there is no claim 1 and ] the discharge lamp lighting device of a statement 6 either. The timer means can make influence of the high tension by a pulse means hard to be able to insulate a timer means from the pulse means of high tension electrically generally, and to be influenced.

[0036] According to the discharge lamp lighting device according to claim 8, in addition to the discharge lamp lighting device according to claim 7, since an insulating means of communication is a photocoupler, it can insulate electrically easily.

[0037] Since the discharge lamp lighting device given in claims 1 thru/or 8 which make a discharge lamp turn on was provided according to the lighting system according to claim 9, each effect can be done so.

[0038] Since the discharge lamp lighting device given in claims 1 thru/or 8 which make a discharge lamp turn on was provided according to the lighting system according to claim 10, each effect can be done so.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is a circuit diagram showing the 1 embodiment of the discharge lamp lighting device of this invention.

[Drawing 2] It is a sectional view showing a lighting system same as the above.

[Drawing 3] It is a wave form chart showing operation same as the above.

[Description of Notations]

1 The floodlight as a lighting system

2 Device body

4 Discharge lamp lighting device

9 High intensity discharge lamp

21 The pulse circuit as a pulse means

22 The photocoupler as an insulating means of communication

23 The voltage monitoring circuit as a voltage monitoring means

24 The timer circuit as a timer means

25 The current detecting circuit as a current detecting means

26 The lighting discrimination circuit as a lighting detection means

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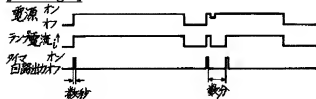
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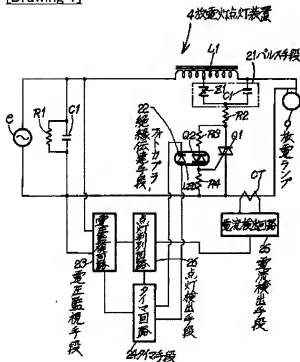
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[Drawing 3]

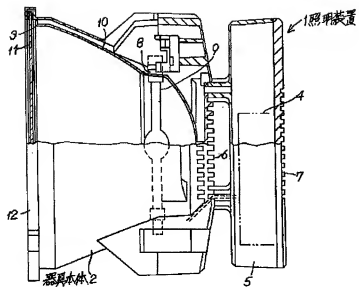


[Drawing 1]



[Drawing 2]





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